

## **BASIC VETERINARY EPIDEMIOLOGY 1**

### **Course objectives**

Participants will acquire basic epidemiological skills; they will learn to conduct an outbreak investigation applying appropriate epidemiologic methods. Emphasis is placed in analysis and interpretation of field data, diagnostic test results, and the use economic principles in animal health.

### **Course contents**

#### Infectious diseases and disease process on a population basis

1. Population homeostasis and pathogenesis
2. Diagnosis of infectious diseases on an individual and population basis
3. Outbreak investigation
4. Sampling in disease investigation
5. Questionnaire design

#### Statistics and descriptive epidemiology

1. Probability distributions
2. Central tendency measures
3. Data dispersion measures
4. Hypothesis testing (p values, confidence intervals)
5. Type I and II errors and power of the test
6. Rates, ratios and proportions
7. Prevalence and incidence
8. Cumulative incidence and incidence density rate

#### Data presentation

1. Types of data
2. Tables, graphs and charts

#### Properties of diagnostic tests

1. Sensitivity and specificity
2. Characteristics of diagnostic and screening tests
3. Validity and repeatability of a test
4. Predictive values and their relationship to sensitivity, specificity and prevalence

#### Study design

1. Differences between descriptive and analytic epidemiology
2. Differences between association and causation
3. Relative risk, attributable risk and odds ratio
4. Validity, precision, biases, randomization and confounding
5. Common study designs, advantages and disadvantages
6. Design and conduct of clinical trials for evaluation of a biological product
7. Cohort studies
8. Case-control studies.

#### Economics in animal health issues

1. Application of economic principles to animal health program analysis and decision making process
2. Structure and philosophies of trade and markets with reference to government control strategies

### Critical evaluation of scientific literature

1. Understand the structure of scientific journal articles and what to look for in each section of an article
2. Critique of epidemiological studies and scientific journal articles

## **EPIDEMIOLOGY IN ACTION**

### **Course Objectives**

Participants will review epidemiology principles, design an epidemiology study, and prepare a project plan. Participants conduct literature reviews and design and test survey instruments. Epi-Info software will be used to develop a questionnaire that is appropriate to the scope of the project. In the interim period between the first and second weeks, the participant will conduct their study and perform preliminary analysis with consultation from the mentor, as necessary. During the second week, participants will complete analysis of the data, draft a project report, and present findings. Workshops on report writing and presentation skills will be offered.

This course will provide participants an opportunity to conduct an epidemiologic study so that they can:

1. Practice epidemiology skills in a field setting
2. With the assistance of an assigned mentor, develop a project plan to be conducted between the first and second weeks of the course, and
3. Contribute to the Agency's problem solving and decision-making.

### **Final Outcome**

After the second session has been completed, participants are expected to:

- Provide the course coordinator with a written report of their project to include the purpose, objective, study design, results, and discussion of the results of their project, and
- Present project results to those who would have an interest in the project (e.g. at a Work Conference)

### **Course contents**

Epidemiological Principles Overview

Study Design

Developing Objectives and Hypotheses

Test sensitivity, specificity, and predictive values

Literature Search Techniques

Determining Sample Size

Questionnaire Development

Critical Analysis of scientific Literature

Getting data into Epi-Info

## **RISK ANALYSIS FOR DECISION MAKERS**

### **Course objectives**

Decision makers who use risk analysis to evaluate trade decisions are the focus for this class. This course will present preferred methods for critically evaluating analysis. Instruction includes materials and methods of risk analysis and present rules and regulations regarding importation of animals and animal products and sanitary and phytosanitary issues. Examples of risk analysis done by VS are presented and mitigation strategy effects on risk are discussed.

### **Course contents**

1. Overview of the risk analysis process
2. Likelihood estimation – The use of scenario trees and conditional probabilities in evaluating the likelihood of disease introduction
  - a. Using conditional probabilities
  - b. Creating scenario trees
  - c. Partially deterministic vs. stochastic simulation modeling
  - d. Stochastic processes (binomial, hypergeometric, Poisson)
  - e. Bayes theorem
  - f. Likelihood model mechanics
3. Example applications
4. Biological consequence estimation – the use of state transition models for evaluating potential disease spread modeling
  - a. The mechanics of state transition models – Markov chains
5. Economic consequence estimation